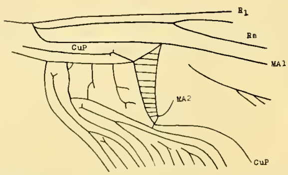
branch MA; arculus incomplete below (MA and CuP not connected except by normal cross-veins). The basic subdivisions of this area are as figured by Tillyard, but his naming of the veins differs from that adopted here. The vein designated Ms is an intercalated convex vein of the radial field, IR_3. Distally a convex vein is intercalated between R_2 and R_3 and shorter ones close to the wing margin. CuP is a fairly strong, concave vein, running below the arculus to join the triangle at its proximal angle; there it turns sharply downwards, at right angles to its previous course, forming the proximal side of the triangle itself. At the lower end of the triangle it turns again abruptly almost through a right angle and passes in a strong arch to the wing margin, giving off one or two short branches on its lower side. The anal vein is a strongly-marked, convex vein, running in a gentle curve from the base towards the proximal angles of the triangle, where it is connected to CuP by a cross-vein. Branches of A arising as a pectinate series on its lower side. All branches strongly curved, the distal two appearing more as a forked vein with the stem of the most distal incorporated in the subtriangle. The complete structure of the triangle is outstanding. First, the triangle is really quadrangular, being closed at the lower end by a distinct but short, almost transverse cross-vein which is in line with a similar one closing the subtriangle



Text-figure 1.—F.3162, *Aeschnidiopsis flindersiensis* (Woodward). Triangle and associated structures. × 2 *ca.*

below. The triangle is very long and narrow, lying transverse to the length of the wing. Its proximal margin is formed by portion of the concave vein CuP. Its upper margin is a strong cross-vein connecting CuP to the strongly convex MA. At this cross-vein MA forks into two convex veins, the lower branch MA_2 forms the distal margin of the triangle and runs almost parallel to the concave CuP to the lower end of the triangle, which is closed by another quite short cross-vein. Beyond the lower end of the triangle MA_2 turns abruptly through more than a right angle and merges into the wing membrane, becoming lost in the intercalated concave and convex branches lying between MA_1 and CuP, though it is possible that it may still persist in one of these branches. (These branches are designated Msp1 in Tillyard's figure.)

The subtriangle is bounded proximally by A, above by a strong cross-vein to CuP and below by another, very short, cross-vein to CuP. Its proximal border is not clearly defined, as there are one or two short branches running from the stem of A into the area but not reaching its lower border.

The species is of interest mainly for its abnormal triangle and in being one of the few known Cretaceous insects.

References.

Carpenter, F. M., 1932.—Jurassic Insects from Solenhofen. *Annals Carnegie Mus.*, 21 (3) : 97-129.
Handlirsch, A., 1908.—Die fossilen Insekten, etc. : 667.
Tillyard, R. J., 1917.—Mesozoic Insects of Queensland No. 2, Proc. Linn. Soc. N.S.W., 42 : 676-692.
Woodward, H., 1884.—On the Wing of a Neuropterous Insect from the Cretaceous Limestone of Flinders River, North Queensland, Australia, *Geol. Mag.* (ns), 1 : 337-339.

PLATE IV.

Aeschnidiopsis flindersiensis (Woodward), hindwing, F.3162. 1, × 2 *ca.*; 2, basal portion, × 4 *ca.*

NOTES ON THE BACTERIA BELONGING TO THE *RHODOBACTERIINEAE* BREED, MURRAY AND HITCHENS, AND THE *CHLAMYDOBACTERIALES* BUCHANAN OCCURRING AT MACQUARIE ISLAND.

By J. S. Bunt,* Australian National Antarctic Research Expedition.

(Plate v.)

[Read 26th May, 1954.]

Synopsis.

The presence is recorded of purple photosynthetic bacteria, filamentous sulphur bacteria and "iron" bacteria under subantarctic conditions. This note is based on observations made during a broad microbiological survey conducted by the author as a member of the 1951–52 field party of the Australian National Antarctic Research Expedition to Macquarie Island.

A. The Chlamydobacteriales Buchanan.

1. *The "Iron" Bacteria.*

The climate of Macquarie Island is cold and wet (Mawson, 1943). In addition to numerous creeks, there are a great many small ponds, especially in areas where the water table is close to the surface of the ground, and the soils, even on the steeply sloping parts of the island, are sometimes constantly saturated with drainage water from higher areas. In such situations, brown gelatinous masses or flocculent reddish-brown sediments of ferric hydroxide are very common. An examination of a small quantity of this material proved to be rich in a species of *Crenothrix* Cohn.

According to Halvorsen (1931), these bacteria occur in situations which would allow spontaneous precipitation of iron hydroxides. They do not carry the reaction beyond the point which would be reached in their absence, so that, although they are abundant, their importance is a matter of some doubt. Further, Halvorsen (1931) has shown that heterotrophic soil bacteria exert a significant influence on the precipitation of iron by affecting the environmental conditions in the soil, and considers that their importance in this respect has been under-estimated. The author has found that several types of heterotrophic bacteria common throughout the soils of Macquarie Island are capable of precipitating iron hydroxide readily from ferric ammonium citrate. It is suggested that these specific types, by their direct action, and the general heterotrophic population, by its indirect influence, are the most important microbial agents causing iron deposition under these conditions.

2. *Filamentous Sulphur Bacteria.*

Representatives of this group were found under both marine and fresh-water conditions. A bottle of sea-water, collected at 11 fathoms in Haselborough Bay and stored at about 10°C. for several months, developed a very fine veil-like growth attached to the walls of the jar. A stained smear showed the organism to have the morphology of *Thiothrix marina* Molisch. This species was subsequently found in salt-water rock pools, often associated with decomposing seaweed.

A similar growth was occasionally observed in slowly moving fresh water, especially in the Finch Creek sub-glacial herbfields. The thick, felted, pale yellow mass appeared to consist of several species of *Thiothrix* Winogradsky, the dominant type occurring as long, unbranched filaments (Plate v, fig. 2) which break up into segments 1–2μ long and about 0·5μ wide. The second type (Plate v, fig. 3), which has filaments up to 3μ wide and of varying length, may be *Thiothrix nivea* (Rab.) Winogradsky. Both organisms were found to be Gram-negative.

* School of Agriculture, University of Sydney.

B. The Rhodobacteriineae Breed, Murray and Hitchens.

Purple photosynthetic bacteria are sometimes to be seen in muddy pools in the sub-glacial herbfields. They are most noticeable in the boggy areas of the north-west coast. An attempt was made to cultivate members of this group, using five different samples of soil. A sodium sulphide medium (Allen, 1950) was used to stimulate growth of the Thiorhodaceae and a medium containing sodium butyrate and yeast extract (Allen, 1950) for the aerobic and anaerobic Athiorhodaceae. A purple-pigmented organism (Plate v, fig. 1) developed from only one of the samples, a bog soil from the sub-glacial herbfields 500 feet above sea level, inoculated into the sodium butyrate medium and incubated in the light under anaerobic conditions. The bacteria were Gram-negative, 3–5μ long by 2μ wide, and may be a species of *Rhodopseudomonas* Kluyver and van Niel.

The presence of purple bacteria in visible quantities was not realized until the author made a further brief visit to Macquarie Island in March, 1953, when a special search was made to supply material for Professor Baas Becking, of the C.S.I.R.O. Fisheries Division, Cronulla. It seems highly probable that a more detailed study by Professor Baas Becking may uncover a greater diversity of types and provide some information regarding their physiological activities.

References.

Allen, O. N., 1950.—Experiments in Soil Bacteriology. Burgess Pub. Co., Minn.

Bergey's Manual of Determinative Bacteriology. Sixth Edition.

Halvorsen, H. O., 1931.—Studies on the Transformation of Iron in Nature. III. The Effect of CO_2 on the Equilibrium in Iron Solutions, *Soil Sci.*, 32 : 141-65.

Mawson, D., 1943.—Macquarie Island, Its Geography and Geology, *Australasian Antarctic Expedition, 1911–14,* Scientific Reports, Series A, Vol. V.

EXPLANATION OF PLATE V.

1, ? *Rhodopseudomonas* sp. in enrichment culture. Gram stain. (3–5 × 2μ.)

2, *Thiothrix* sp. Filaments and individual segments. Smear from material collected in the field. Gram stain.

3, *Thiothrix nivea* ?. Filaments in smear of sample collected in the field. Gram stain.